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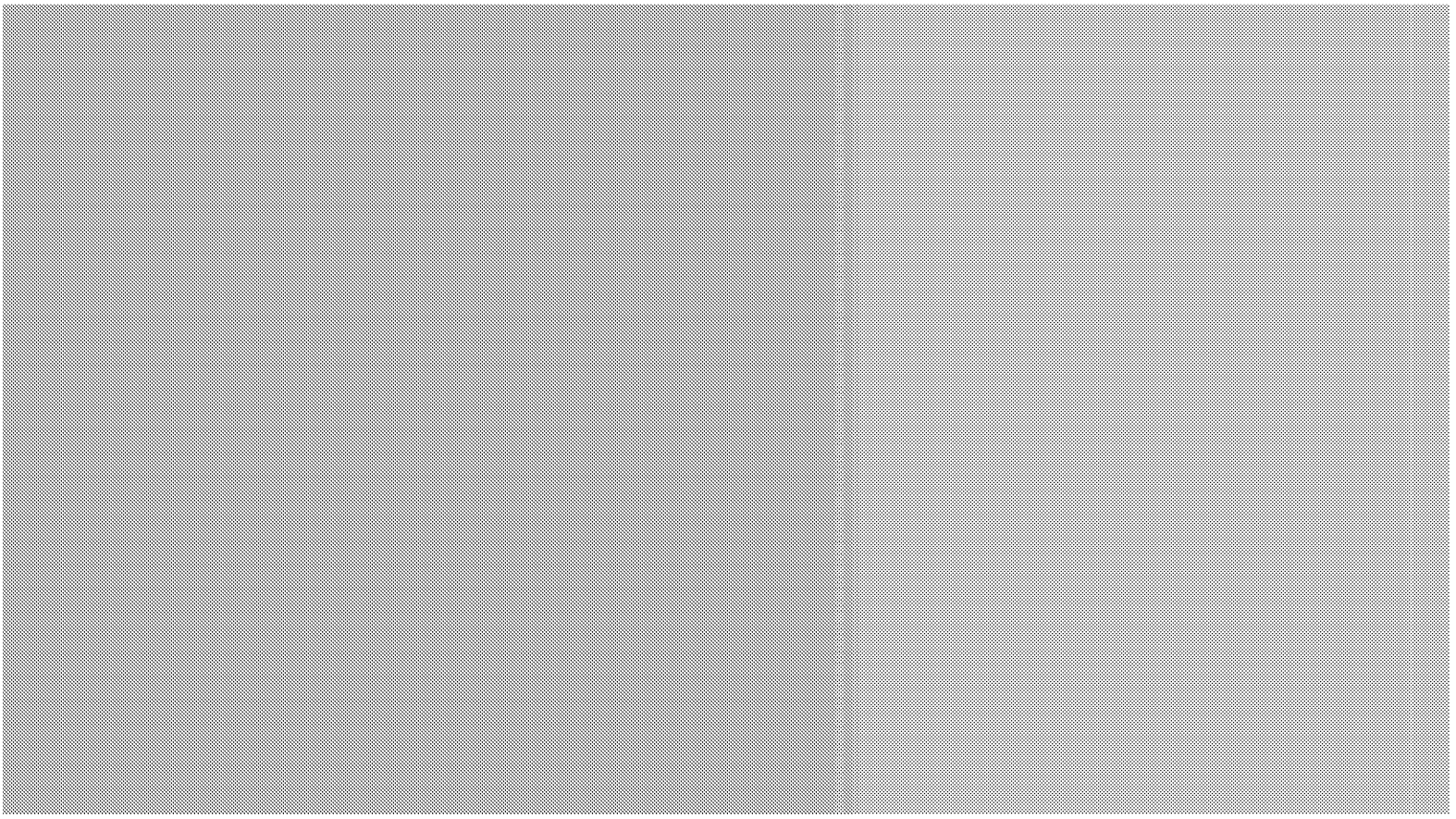
Field Sampling and Analysis Plan

Former Burlington Industries Cheraw Site
Docket No. 04-2017-3459

650 Chesterfield Highway
Cheraw, Chesterfield County
South Carolina



Former Burlington Industries Cheraw Site
Cheraw, South Carolina
Docket No. 04-20174-3549

Field Sampling and Analysis Plan
November 22, 2017

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Field Sampling and Analysis Plan

Prepared For And Submitted To The
United States Environmental Protection Agency
Region IV
Atlanta, Georgia 30303

November 22, 2017

On Behalf Of:
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ACRONYMS AND ABBREVIATIONS

AOC	Agreement and Order on Consent by Removal Action
bgs	below ground surface
Burlington	Burlington Industries, Inc.
COC	chemicals of concern
DQOs	Data Quality Objectives
EPA	United States Environmental Protection Agency
FSAP	Field Sampling and Analysis Plan
ft	feet or foot
GPS	global positioning system
Highland	Highland Industries, Inc.
IDW	investigation derived waste
mg/kg	milligrams per kilogram (or parts per million)
OSC	USEPA Region 4 On-Scene Coordinator
PCB	polychlorinated biphenyls
PPE	personnel protective equipment
PUPS	Palmetto Utility Protection Service
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
RA	Removal Action
Respondent	Highland Industries, Inc.
RSL	Regional Screening Level
sample ID	sample identification code
SCDHEC	South Carolina Department of Environmental Control
SOW	Statement of Work

1.0 INTRODUCTION

This Field Sampling and Analysis Plan (FSAP) describes the methods to be used to collect soil and sediment samples associated with the Former Burlington Industries Cheraw Site (Cheraw Site or Site) in Cheraw, Chesterfield County, South Carolina (Figure 1).[1] This document will be used in conjunction with the Cheraw Site Removal Action (RA) Work Plan (AECOM, November 2017) and the Quality Assurance Project Plan (QAPP).

The purpose of the FSAP is to establish procedures for data collection activities identified in the RA Work Plan that are consistent with data quality objectives (DQOs) presented in the QAPP and to provide a framework for planning and conducting field activities. This FSAP provides instructions and guidance for the field work by defining the sampling and data-gathering methods to be used. The environmental media addressed in this FSAP are limited to sediment, and soil samples associated with the selected remedy as presented in the Cheraw Site AOC (EPA, October, 2017). Previous assessment activities have determined that historical discharges from the manufacturing plant have impacted soils in the area located in the northwestern portion of the Cheraw Site and sediments in The Western Ditch which flows generally north to an unnamed tributary of Wilson Branch that discharges to Huckleberry Branch, and Huckleberry Park (Figure 2).

1.1 Background

1.1.1 Ownership

From the 1960s until 1988, Burlington Industries, Inc. (Burlington) operated a textile manufacturing plant known as the James Fabrics Plant #0154 (James Fabrics Plant), located at 650 Chesterfield Road, Cheraw, South Carolina

[1] The Introduction Section of this FSAP is meant for general description purposes only. For more background information relating to the Site, AECOM prays reference to the information contained in the administrative record and the definitions, terms and conditions of the Administrative Settlement Agreement and Order on Consent executed on October 23, 2017 by Highland Industries, Inc. (Highland) and the United State Environmental Protection Agency (EPA), CERCLA Docket No.04-2017-3459 (AOC).

In March 1988, Highland Industries, Inc. (Highland) purchased 51.7 acres of the property located at 650 Chesterfield Road, Cheraw, South Carolina from Burlington that included what was then the James Fabrics Plant (the "Highland Plant") and began operating a textile manufacturing plant.

1.1.2 Site Investigations

Since October of 2015, SCDHEC has performed investigations of portions of the Former Burlington Cheraw Site and surrounding areas An analysis of soil and sediment samples SCDHEC collected revealed that soil and sediments samples in in the northwestern corner of the Highland property, the Western Ditch (as defined in the EPA AOC), Huckleberry Park, and residences along Pecan and Robin Hood Drive contain polychlorinated biphenyls (PCB) Aroclor 1248 in concentrations above the EPA Region 4 Regional Screening Level ("RSL") for PCBs.

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The findings of the SCDHEC sampling are contained in the Administrative Record for the Site.

1.2 FSAP Scope

On October 23, 2017, EPA and Highland entered into an Administrative Settlement Agreement and Order on Consent for Removal Actions (AOC); Docket No. 04-2017-3459 (AOC, October 2017). In the AOC, Highland agrees to finance and perform the removal action specified in the AOC and an accompanying Statement of Work (SOW) for the Cheraw Site (AOC, October 2017). The remedy for impacted soils applies to the northwestern portion of the Highland plant, the area between the Western Ditch cut bank and the residential property boundary markers, and Huckleberry Park soils. The remedy for the Western Ditch sediment extends from the northwestern portion of the plant to and including portions of residential properties adjacent to the Western Ditch for approximately 1,900-feet east-northeast (downstream) from the Highland plant.

The Cheraw Site and the subportion Western Ditch are defined more specifically in the AOC

This FSAP, which was prepared in accordance with the Cheraw Site AOC, specifically addresses the field sampling and analysis activities pertaining to the removal actions specified for soils and sediment at the following areas; northwestern portion of the Highland plant, the area between the Western Ditch cut bank and the residential property boundary markers, and Huckleberry Park soils and Western Ditch sediments. Chemicals of concern (COCs) associated with soils and sediments

and their respective media-specific cleanup levels were presented in the AOC and are summarized below:

Chemicals of Concern	Cleanup Level	
	Soil	Sediment
Total PCBs – High Occupancy Area	1 mg/kg	1 mg/kg
Total PCBs – Low Occupancy Area	25 mg/kg	25 mg/kg

mg/kg = milligrams/kilogram (or parts per million)

The focus of RA activities involves characterization, sampling, and analysis of Cheraw Site soil and sediment to address their respective COCs or secondary parameters associated with these COCs. Soils outside of Cheraw Site areas, and other environmental media such as groundwater, air, and manufacturing waste streams, are beyond the scope of this FSAP and are not addressed herein.

Procedures for the collection of environmental samples, sample custody, sample preservation, and equipment decontamination presented in this FSAP are consistent with the *US EPA Region IV Environmental Investigations Standard Operating Procedures and Quality Assurance Manual* (EPA, November 2001) and *Field Branches Quality System and Technical Procedures*.

2.0 UTILITY CLEARANCE

A utility clearance will be conducted anytime soil borings will be installed using direct push technology (e.g., GeoProbe®), anytime soil or sediment is excavated by mechanical means, and anytime borings are installed in excess of three feet (ft) below ground surface (bgs) by any means. Palmetto Utility Protection Service (PUPS) is a public utility locater service that delineates the location of underground public utilities such as water lines, sewer lines, electric, gas lines, and fiber optics. In addition to utilizing the services of PUPS, a private utility locator will be contracted to augment the PUPS information if there is good reason to suspect that private utilities are located in an area where intrusive field work is proposed.

PUPS will be contacted by telephoned at least 72 hours prior to the initiation of intrusive field activities to identify underground utilities in the areas where borings will be installed. A minimum 72 hours advance notice is required to ensure utilities are accurately and completely located. The telephone number for PUPS is 811 or 1-888-721-7877.

3.0 FIELD RECORDS

Documentation of field activities provides the basis for technical site evaluations and related reports. It is essential that all field documentation provide a clear, unbiased picture of field activities. All aspects of sample collection and handling, as well as visual observations, will be documented in the field books, field forms, and/or photographs.

3.1 Field Logbooks

Bound field logbooks will be used to document activities on work assignments conducted in the field. The following information will be provided on the inside front cover or the first page of the field book:

- Project Name and Project Manager,
- Site Location,
- Job Number,
- Date,
- Individual(s) to whom the field logbook is assigned.

Instructions and procedures relating to the format and technique in which notebook entries are made are as follows:

1. Leave the first two pages blank. They will provide space for a table of contents to be added when the field notes are complete.
2. Make entries in waterproof ink.
3. Make entries in language that is objective, factual, and free of personal feelings or other terminology which might appear unclear or inappropriate.
4. Print entries as neatly as possible.
5. Log entries in military time format.
6. Indicate errors in the field notes by drawing a single line through the text, ensuring the text is still legible, and initialing and dating the errors.
7. Start a new page at the beginning of each day's field activities. Mark out the remaining clear portion of a page at day's end with a single initialed line.
8. Initial, number sequentially, and date each page.

9. Start each day's activities with a new page, and note the date, time, on-site personnel, and observed weather conditions. Note changes in weather conditions as appropriate.

10. Later additions, clarifications, or corrections must be dated and signed.

11. Document on-site health and safety briefings.

12. Include sketches or maps to identify photo and/or sample locations in the field logbook, and include landmarks and direction of north.

13. For sampling information, include sample number, date, and time, and reference sample locations to sample numbers on a site sketch or map.

14. When conducting field measurements, document important information such as sample location, date, time, and personnel taking measurements.

15. If on-site interviews occur, record relevant information. Include the names of persons interviewed, the interest group represented (if applicable), address, and phone number.

3.2 Field Forms

Field forms are used to record repetitious field entries such as sampling date, time, sample identification, person collecting sample, etc. Specific field forms will be used for recording field data associated with the collection of soil and sediment samples, and with the calibration of field equipment. When used, field forms will be pre-generated on paper with adhesive backing. Field information will be entered in the designated field form while in the field. When all data and observations are entered onto the field form, the field form backing will be lifted exposing the adhesive, and the field form will be entered directly into the field logbook. Field logbook page's containing field forms will be sequentially numbered, initialed, and dated consistent with pages containing hand written notes, information, and data.

3.3 Photographs

Photographs may be taken while in the field. It is preferable to use a digital camera when photographs are taken. Photographs taken in the field will be documented in the field logbook. Documentation may include reasons for taking photographs. Due to the large number of photographs that can be taken using a digital camera, it may be impracticable to log each individual photograph taken; however, general information will be entered into the field logbook such as the date and time that the photographs were taken, the locations where photographs were taken, name

of photographer, and a description or identification of the subject(s) photographed. If necessary, the locations of photographs will be referenced to a site map or sketch. After the photographs are downloaded onto computer, the name of the electronic folder that contains the photographs will include the topic and date when the photographs were taken (e.g., Cheraw Soil Sampling 11-07-17). Key photographs may be named using a brief description of the photograph (e.g., soil sample #5).

4.0 SAMPLE IDENTIFICATION AND SAMPLE LABELS

Procedures for preparing unique sample identification codes (sample ID) and completing sample labels are presented in Sections 4.1 and 4.2, respectively.

4.1 Sample Identification Code

All samples collected for analysis will be assigned a unique sample ID. The unique sample ID will include information about the sample matrix, sampling location or sampling sequence, sampling date, sampling depth, and quality assurance/quality control (QA/QC) sample type, if applicable. All unique sample IDs will be logged onto a sample container label as well the appropriate field form (Section 3.2).

In addition, the sample ID will identify if the sample is a QA/QC sample. QA/QC samples may include duplicate samples, split samples, matrix spikes, matrix spike duplicates, and equipment blanks. The sample IDs will be recorded on the sample label (Section 4.2), on the appropriate field form (Section 3.2), in project field logbook (Section 3.1), on sample chain-of-custody forms (Section 7.0), and in the project database.

The following sample designation methodology will be used:

Sample Media Code: A two- to three-letter alphabetic code will identify the sample media:

- SS = soil sample
- CSS = confirmation soil sample
- SD = sediment sample
- CSD = confirmation sediment sample
- WC = waste characterization sample (stockpiled soil or sediment wastes)

Sample Sequence/Location Code: A one to six-digit alpha-numeric code (e.g., 1, A2, 44, RR03, SB1802, etc.) is entered following the sample media code to identify sample sequence or dedicated sampling station.

Date Code: A six digit date code is entered following the sample sequence or dedicated sampling station code. The date code will be enclosed in parentheses. For example, if the sample is collected on November 3, 2017, the date code would be (110317).

Sample Depth Code: A two character alpha-numeric code beginning with the letter "D" to indicate a specific sample depth in feet:

- D0 = surface sample
- D1 = 1 ft bgs
- D2 = 2 ft bgs, etc.

The reference depth for confirmation samples will be the actual final excavation depth from which confirmation samples are collected following media excavation/removal. For example, if two feet of soils are excavated and a confirmation soil sample (CSS) is collected from the bottom of excavation exposed soils following soil removal, the depth code would be D2 (surface sample). No depth code will be used for waste characterization (WC) samples or equipment blanks (EB).

QA/QC Sample Code: A two- to three-letter alphabetic code to identify QA/QC samples only:

- FDP = field duplicate sample
- SP = split sample
- MS = matrix spike
- MSD = matrix spike duplicate
- EB = equipment blank

No QA/QC code is warranted when samples are collected for routine analysis only and not analyzed for QA/QC purposes.

Following are examples of the sample nomenclature methodology:

SS-IA22(121417)D1 Soil sample (SS) collected December 14, 2017 (121417) from location IA22 (IA22) from a depth of 1 ft. below ground surface (D1).

SD-WMP5(121217)D0 Sediment sample (SD) collected on December 12, 2017 (121217) from sample station WMP5 (WMP5) from the sediment surface (D0).

SD-SB17(110117)D0-SP QA/QC split (SP) sediment sample (SD) collected on November 1, 2017 (110117) from sample station SB17 (SB17) from the sediment surface (D0)

SD-3(060318)EB Third (3) QA/QC equipment blank (EB) associated with equipment used to collect sediment (SD) samples collected on June 3, 2018 (060318).

4.2 Sample Labels

Adhesive sample labels will be provided by the analytical laboratory with the sample bottleware. Adhesive field forms will be prepared by AECOM for use in the field. The sample label and the field form will be completed in the field during the time the sample is collected. Likewise, the sample label and the field form must be affixed onto the container used to collect the sample and into the field logbook, respectively at the time the sample is collected.

The following information may be included on sample labels:

- Project number or name;
- Unique sample ID that can be correlated with the location where the sample was collected;
- Date and time of sample collection;
- Designation of the sample as either a grab or composite sample;
- The initials of one of the samplers;
- Whether the sample is preserved or unpreserved and if preserved, what type of preservative is used; and
- The analytical method to be performed and pertinent instructions.

5.0 FIELD ANALYSES

5.1 Field Analyses Equipment

If present and/or encountered measurements of surface water and groundwater temperature, pH, conductivity, turbidity, and dissolved oxygen may be made in the field during sediment and/or groundwater sample collection using the appropriate field instruments. In addition to the field measuring instrument, the appropriate calibration standards will be needed to calibrate field instruments daily. All field equipment will be maintained and operated in accordance of the manufacturer's instructions.

5.2 Field Analyses Equipment Calibration

All field monitoring equipment will be calibrated at the beginning of each day. Daily field instrument calibrations will be documented directly in the field logbook or on the appropriate calibration forms. If calibration forms are used, they will be entered into the field logbook following equipment calibration (Section 3.2). All field equipment will be calibrated in accordance with the manufacturer's calibration procedures.

5.3 Field Measurements

Physical/chemical parameters of surface water and/or groundwater may be measured in the field during sediment sampling. Physical/chemical parameters of surface water and/or groundwater may include:

- Temperature
- Conductivity
- Dissolved oxygen
- pH
- Total dissolved solids
- Turbidity

When conducting field measurements of surface water, the field instrument probe will be immersed directly into the surface water at the location where samples will be collected. Turbidity measurements will be taken by collecting a representative sample from the surface water body and placing it into the meter. Field measurements will be recorded onto the appropriate field form and the field form will be entered into the field logbook following sample collection.

6.0 SAMPLE COLLECTION PROCEDURES

Use of proper sampling procedures is necessary to ensure that representative samples for analysis are collected. All samples collected for laboratory analyses will be collected using equipment that is properly decontaminated (Section 9.0). In addition, persons collecting samples for laboratory analyses will wear new, powder-free nitrile or latex gloves when collecting the sample.

6.1 Sample Types

Samples collected for laboratory analyses during RA activities will be either grab samples (Section 6.1.1), composite samples (Section 6.1.2), or QA/QC samples (Section 6.1.3). The type of sample collected will be recorded on the sample label and field sampling form/field logbook.

6.1.1 Grab Samples

A grab sample is a discrete sample collected from a single location at a specific time. The majority of soil and sediment samples collected for RA activities will be grab samples.

6.1.2 Composite Samples

A composite sample is a sample collected over a temporal or spatial range that typically consists of a series of discrete samples of equal volume that are combined or "composited". There are two types of composite samples that may be collected during RA activities: an areal composite sample and a vertical composite sample.

An areal composite sample is a sample comprised of individual grab samples collected over an area or grid. Discrete grab samples of equal volume are collected in an identical manner from several locations over a defined area. The grab samples are subsequently combined to generate a composite sample. For example, an areal composite soil sample may be comprised of four surface soil grab samples of equal volume collected from four mutually adjacent sample locations on a sampling grid.

A vertical composite sample is comprised of individual grab samples of equal volume collected from a single vertical cross section of the media (e.g., soil/sediment column). Each individual grab sample is collected in an identical manner. For example, a vertical composite soil sample may be

comprised of three soil grab samples of equal volume collected from depths of zero (0) ft bgs (surface sample), 2 ft bgs, and 4 ft bgs from a single sampling location.

Composite samples will be quartered and homogenized before being placed into the sample containers using the following procedure:

1. Discrete grab samples that will comprise the composite sample are placed in a common stainless steel bowl or pan.
2. When all discrete grab samples have been collected, the combined samples are divided into quarters and each quarter is mixed individually.
3. Two adjacent quarters are combined to form halves and each half is mixed individually and thoroughly.
4. The two halves are combined and mixed thoroughly to form a homogenous composite sample.

6.1.3 Quality Assurance/Quality Control Samples

QA/QC samples are samples collected to verify that the sampling and analysis protocols are meeting DQOs in accordance with the QAPP and determine if data limitations may exist. Following are descriptions of QA/QC samples that may be collected during RA activities:

Split Samples – A sample that has been divided into two or more containers from a single sample. Adequate mixing will be performed such that the two portions of a split sample are, for all practical purposes, homogeneous and identical. The primary purpose of a split sample is to measure any variability between different analytical laboratories.

Duplicate Samples – Two or more samples collected from a common source. The samples are collected simultaneously from the same source under identical conditions into separate containers. The primary purpose of a duplicate sample is to measure analytical variability of one analytical laboratory.

Control or Background Samples – A sample taken in an area known or thought to be free from the COCs.

Equipment Blank – A sample of organic-free deionized water that has been passed across the surface of sampling equipment after the equipment has been decontaminated. The equipment blank is used to check for the effectiveness of the field decontamination procedure between samples.

QA/QC samples will be collected in accordance with the QAPP.

6.2 Soils

The Cheraw Site remedy for soils involves the excavation and offsite disposal of soils containing PCBs at concentrations above their respective cleanup levels. Consequently, it is anticipated that soil sampling will be limited to the collection of surface and shallow subsurface (1 to 2 ft bgs) samples. Furthermore, it is anticipated that analyses of soil samples will be limited to the COCs (PCBs).

6.2.1 Soil Sampling Equipment

Field equipment and supplies that may be used during soil sample collection include:

- Hand auger
- Nitrile or latex gloves
- Sampling forms
- Sample containers
- Sample container labels
- Sample container seals
- Digital camera
- Wooden stakes and flagging
- Stainless steel spoons
- Stainless steel bowls
- Field logbook
- Pen with waterproof ink
- Chain of custody
- Decontamination equipment
- First aid kit
- Global positioning system (GPS) unit

6.2.2 Surface Soil Samples

Surface soil samples will be collected from the land surface to a depth not to exceed 0.5 ft (6-inches) bgs using the following procedural guidelines. Collect surface soil samples using a decontaminated stainless steel spoon or decontaminated hand auger by first scraping away vegetative growth (leaves, stems, grass, roots) and other debris (rocks, trash) until the soil surface is exposed. Use the stainless steel spoon to scrape or dig a sufficient volume of surface soils necessary to fill the sample container. Plant parts and debris encountered beneath the soil surface

should be excluded from the sample. Place the collected soil directly into the sample container. The spoon used to collect the surface soil samples can be used to gently compress the soils into the container such that the sample container has no large voids and there is sufficient sample for analysis. Place the sample container cap back onto the sample container and secure the container. If necessary, take a dry paper towel and remove excess moisture and dirt from the sample container and sample container lid. Complete the sample label and affix it onto the sample container. Place clear tape over the sample label to protect the label. Place the sample container into a closeable plastic baggie and place the sample into a sample cooler containing ice. Record sample collection information onto the appropriate field form and affix the field form into the field log or enter the sample collection information directly onto the in the field logbook (Section 3.0).

6.2.3 Subsurface Soil Samples

Subsurface soil samples may be collected manually using a hand auger (Section 6.2.3.1) or mechanically using a GeoProbe® rig (Section 6.2.3.2). Regardless of installation method, all soil borings will be installed and abandoned in accordance with South Carolina Well Standards R.61-71. Borings from which soil samples will be collected for offsite analysis will be abandoned within five days of borehole completion. Borings installed to a depth of five ft bgs or shallower will be abandoned by backfilling with native fill material. Borings installed to a depth greater than five ft bgs will be filled from the bottom of the borehole to the land surface with bentonite-cement, neat cement, or 20% high solids sodium bentonite grout. The boring will be abandoned by forced injection of grout or pouring through a tremie pipe starting at the bottom of the borehole and proceeding to the surface in one continuous operation. A general description of the boring (e.g. location, installation method, depth) and results of laboratory analyses will be presented in a RA data collection report that will be submitted to the EPA per the *RA Work Plan* schedule (AECOM, November 2017).

Any borings installed for the purpose of collecting geotechnical data or to characterize soil types will be abandoned within five days of borehole completion. Borings installed for these purposes only will be abandoned by backfilling with native fill material removed from the boring to eliminate safety hazards and to minimize the potential for infiltration of surface water runoff entering the boring.

6.2.3.1 Hand Auger

Hand augers are used to collect subsurface soil samples from depths of 0.5 ft bgs to as deep as 10 ft bgs. Each hand auger boring is advanced by manually turning the hand auger until the advance auger head fills with cuttings. The advance auger head is periodically emptied of soil and hand auguring is continued until the target sampling depth is achieved using the following specific procedures. When the target depth is reached, replace the advance auger head with a decontaminated sampling auger head and collect a subsurface soil sample from the target depth within the sampling auger head. Withdraw the hand auger from the boring and collect the subsurface soil samples directly from the sampling auger head using a decontaminated stainless steel spoon. Discard plant parts (leaves, stems, grass, roots) and other debris (rocks, trash) from the sample, if present. Using the stainless steel spoon, obtain a sufficient volume of subsurface soils directly from the hand auger barrel necessary to fill the sample container. Place the collected soil directly into the sample container. The spoon used to collect the surface soil samples can be used to gently compress the soils into the container such that the sample container has no large voids and there is sufficient sample for analysis. Place the sample container cap back onto the sample container and secure the container. If necessary, take a dry paper towel and remove excess moisture and dirt from the sample container and sample container lid. Complete the sample label and affix it onto the sample container. Place clear tape over the sample label to protect the label. Place the sample container into a closeable plastic baggie and place the sample into a sample cooler containing ice. Record sample collection information onto the appropriate field form and affix the field form into the field logbook or enter the sample collection information directly onto the in the field logbook (Section 3.0).

6.2.3.2 GeoProbe®

Subsurface soil samples collected from a GeoProbe® rig will be collected in a clear acetate sleeve inserted into the GeoProbe® hollow-stem probe. The acetate sleeve will be retrieved from the hollow-stem probe by the subcontractor operating the GeoProbe® rig. If the soil sample is collected for geotechnical or soil classification purposes, the soil sample may be capped on both ends and retained within the acetate sleeve for future reference. If the soil sample is collected for analytical purposes or if direct observation of the soil is desired, the sleeve may be sliced open by the subcontractor operating the GeoProbe® rig.

When obtaining a subsurface soil sample for analysis, collect the subsurface soil sample from the desired depth directly from the acetate sleeve using a decontaminated stainless steel spoon. Discard plant parts (leaves, stems, grass, roots) and other debris (rocks, trash) from the sample, if present. Using the stainless steel spoon, obtain a sufficient volume of subsurface soils directly from the acetate sleeve as necessary to fill the sample container. Place the collected soil directly into the sample container. The spoon used to collect the surface soil samples can be used to gently compress the soils into the container such that the ample container has no large voids and there is sufficient sample for analysis. Place the sample container cap back onto the sample container and secure the container. If necessary, take a dry paper towel and remove excess moisture and dirt from the sample container and sample container lid. Complete the sample label and affix it onto the sample container. Place clear tape over the sample label to protect the label. Place the sample container into a closeable plastic baggie and place the sample into a sample cooler containing ice. Record sample collection information onto the appropriate field form and affix the field form into the field logbook or enter the sample collection information directly onto the in the field logbook (Section 3.0).

6.3 Sediments

Sediment sampling techniques and equipment are designed to maintain the integrity of the sample. When collecting two or more sediment samples from a common stream, collect the most downstream sample first followed by the next (closest) upstream location. The last sediment sample collected from a single stream or tributary should be the sample located furthest upstream.

Equipment typically needed when collecting sediment samples is presented in Section 6.3.1. It is anticipated that direct collection of sediment samples using a spoon or scoop will be the primary method used to collect most sediment samples from the Western Ditch. The procedure for direct sediment sampling using a spoon or scoop is described in Section 6.3.2. Direct sediment sampling using a core sampler may be the best technique when a vertical composite of the stream bed or pond sediment is desired. The procedure for sediment sampling using a core sampler is described in Section 6.3.3.

6.3.1 Sediment Sampling Equipment

Field equipment/supplies needed for collecting sediment samples may include the following:

- Waders
- Nitrile or latex gloves
- Sampling forms
- Sample containers
- Sample container labels
- Sample container seals
- Wooden stakes and flagging
- Special sample collection devices
- Digital camera
- Paper towels
- Field logbook
- Pen with waterproof ink
- Chain of custody
- First aid kit
- GPS unit

6.3.2 Scoops and Spoons

Stainless steel scoops or spoons will be used to collect sediment samples from shallow portions of the Western Ditch using the following procedure. In surface water bodies that are too deep to wade, but less than eight feet deep, a stainless steel scoop attached to a piece of conduit can be used either from the banks if the surface water body is narrow or from a boat. Always face upstream when collecting sediment from a flowing stream. If the water-body is stagnant, collect the sediment sample while standing on the bank, if possible.

After collecting the sediment sample, carefully decant excess water from the sediment sample so that the loss of small sediment fines is minimized. Transfer the sediment from the spoon (or scoop) directly into the sample container. If possible, mark the location so that it can be relocated in the future. Write the sample location identification on colored flagging or other marking device and secure onto a prominent tree, tree limb, or wooden stake located on the adjacent bank closest to the location where the sample was collected. Record the stream sampling location on a project map. Complete the sample label with appropriate sample designation (Section 4.0) and affix to the sample container(s). Record the sample information in the field logbook (Section 3.0) and on the chain of custody form (Section 7.0).

6.3.3 Sediment Core Sampler

A sediment core sampler is used to sample vertical columns of sediment. The sampler applies pressure to the sediment core sampler T-handle and the coring device is forced into the sediment. Some sediment core samplers are equipped with an acetate sleeve that allows the sediment core to be retrieved intact.

After collecting the sediment sample, carefully allow excess water to gravity drain from the coring device. Transfer the sediment sample from the sediment core sampler directly into the sample container. Mark the location so that it can be relocated in the future. Write the sample location identification on colored flagging or other marking device and secure onto a prominent tree, tree limb, or wooden stake located on the adjacent bank closest to the location where the sample was collected. Record the stream sampling location on a project map. Complete the sample label with appropriate sample designation (Section 4.0) and affix to the sample container(s). Record the sample information in the field logbook (Section 3.0) and on the chain of custody form (Section 7.0).

7.0 CHAIN OF CUSTODY PROCEDURES

Chain-of-custody procedures are established to ensure sample integrity by documenting positive custody of sample containers and collected samples. The possession of samples must be traceable from the time that sample containers are provided by the analytical laboratory until the collected samples are received and analyzed by the analytical laboratory. A sample is in custody if:

- It is in possession or view of authorized personnel;
- It is secured by authorized personnel to prevent tampering; and/or
- It is placed in a designated secure area.

Chain-of-custody procedures include the procedures for documenting the identity of samples at the time they are collected in the field (Section 7.1), documenting physical possession of sample bottleware (Section 7.2), and verifying the integrity of sample shipments (Section 7.3).

7.1 Sample Label

Sample labels are documents used to identify the sample and sampling information. Labels remain with the sample from the time it is collected. Sample labels are usually provided by the analytical laboratory. Sample labels have an adhesive backing that allows them to be attached directly onto to each sample container. All sample containers must have an attached sample label and all information on the sample label must be complete. Sample labels can be attached directly onto their respective sample collection containers immediately before or after a sample is collected and will remain attached to the sample container through sample analysis. After attaching the sample label onto the sample container, it is recommended that clear tape be placed over the sample label to protect it from damage due to moisture and blemishes that can make the sample label difficult to read.

7.2 Chain Of Custody Form

The chain-of-custody form is used to document possession and the transfer of possession of sample containers from the time that the new and unused containers are sent by the laboratory to the persons collecting the samples, through field sample collection, and throughout transfer of sample custody from the field to the receiving analytical laboratory. The chain-of-custody record also serves as a sample logging mechanism for the receiving analytical laboratory sample custodian.

Chain-of-custody forms will be completed by providing the information in the spaces indicated on the form. Information to be provided on the chain-of-custody forms includes:

- Project (Cheraw Site)
- Client (AECOM) and contact information
- Sample entry line
  - Unique sample ID (Section 4.0);
  - Date and time sample collected;
  - Sample media (water, soil, sediment, other);
  - Grab or composite sample; and
  - Number of sample containers.
- Sample analyses
- Sample transfer signature

A separate chain-of-custody form should be completed for each sample shipping cooler. The chain-of-custody form will document all of the samples included in a single sample shipping cooler. Ship only as many samples as the sample shipping cooler can comfortably hold taking into consideration the amount of space occupied by packing material (e.g., bubble wrap, cardboard) and ice needed to protect and preserve the samples. If the number of samples shipped in a cooler exceeds the number of sample lines on the chain-of-custody form, use multiple chain-of-custody forms, and write "1 of # pages" in the upper right corner of the first chain-of-custody form sequentially through "# of # pages" on the final chain-of-custody form.

7.3 Custody Seal

A custody seal is a narrow strip of paper with adhesive backing that is placed across each sample cooler lid and cooler body after the cooler is properly packed with samples and is ready for shipment to the analytical laboratory. The person preparing the sample cooler for shipment to the laboratory is responsible for signing and dating the custody seal and placing it onto the sample cooler. The custody seal is placed across the cooler lid and cooler body so that the seal must be broken if the cooler lid is opened. The purpose of the custody seal is to provide a means to verify sample cooler integrity from the time it is prepared for shipment in the field until the cooler is opened by the receiving analytical laboratory.

8.0 SAMPLE PACKING AND SHIPPING PROCEDURES

Safe transport of collected samples from the field to the analytical laboratory is an important part of successful field operations. The following procedures and guidelines will be followed to ensure safe transport of samples to the analytical laboratory. Inspect individual sample shipping coolers to verify their integrity prior to preparing samples for shipment. Make sure that the cooler handles and hinges are intact and that the cooler is not cracked. Prior to packing the cooler for sample shipment, place a piece of duct tape over the cooler drain from the inside of the cooler to minimize the potential of leakage from the cooler drain during shipment.

Protective packaging (e.g., bubble wrap, cardboard) will be provided by the analytical laboratory along with instructions to securely package the samples for shipment. Follow the sample packaging instructions provided by the analytical laboratory.

Place individual sample containers or groups of sample containers from a single sampling location in a sealable plastic baggie to contain the sample in the event that a sample container breaks during shipment. Protective bubble wrap or equivalent may be placed around a sample container before or after the sample container is placed and sealed inside the baggie.

Sufficient wet ice will be packaged and placed inside the sample cooler to maintain sample temperature at or below 6 degrees Centigrade (^{o}C) during shipment. Package the wet ice per the instructions provided by analytical laboratory and take necessary precautions to contain the melt water. The laboratory may provide a temperature blank with each sample shipping cooler. Ensure that the temperature blank is included with the samples prior to sealing the sample cooler for shipment.

Place the chain-of-custody form (Section 7.2) that lists all sample containers included in the sample shipping cooler inside a sealable clear plastic baggie. Tape the baggie containing the chain-of-custody form onto the underside of the cooler lid.

A custody seal (Section 7.3) will be applied onto sample shipping coolers once the coolers are properly and completely packed. The person who is packing the sample cooler will sign and date the seal. With the sample shipping cooler secured, the custody seal will be placed across the cooler lid and cooler body so that the seal will be broken when the cooler is opened. Clear tape may be used to protect the seal during routine handling and shipping.

Samples will be hand delivered or transported to the analytical laboratory via overnight courier authorized laboratory courier, or field staff. Samples will be shipped or transported to the receiving analytical laboratory in a timely manner to receiving laboratory has adequate time to prepare and analyze the samples prior to exceeding preparation and analytical holding times.

9.0 EQUIPMENT DECONTAMINATION PROCEDURES

Decontamination procedures are intended for use by field personnel for cleaning sampling equipment in the field. Sample field equipment cleaned in accordance with these procedures will meet the minimum requirements for DQO data collection as specified in the QAPP.

Proper decontamination of sampling equipment is essential to prevent cross-contamination of samples by the sampling device. All non-disposable sampling equipment will be decontaminated before sampling and before collection of each subsequent sample (unless samples are to be composited). Sampling equipment will be decontaminated with materials and procedures according to the following procedures:

- Clean sample equipment with tap water and laboratory detergent using a brush if necessary to remove dirt and surface films.
- Rinse thoroughly with tap water to remove all indications of the laboratory detergent.
- Rinse thoroughly with deionized water.
- Rinse once with isopropanol if the samples to be collected will be analyzed for organic compounds. Otherwise, rinse once with 0.1 normal hydrochloric acid (0.1N HCl) if inorganic compounds are the constituents of concern. If both organic and inorganic compounds are of concern, the isopropanol rinse will take precedence.
- Rinse thoroughly with organic-free water and allow the sample equipment to air dry.
- Wrap dry, decontaminated sample equipment with plastic or aluminum foil to prevent cross-contamination if equipment is going to be stored or transported.

During the field investigation, large equipment such as drill augers, rods, bits, and/or backhoe equipment may be steam cleaned (soap and high pressure hot water). Tap water (potable) will be used for steam cleaning and will be obtained from a local public water supply.

Investigation derived waste (IDW) may be generated during the decontamination process. Section 10.0 provides procedures for the handling and disposal of non-hazardous IDW.

10.0 INVESTIGATION DERIVED WASTES

IDW may be generated during sample collection and when decontaminating sample equipment. Types of IDW expected to be generated at the Cheraw Site include the following:

- Personnel protective equipment (PPE) – This may include disposable gloves, coveralls, booties, respirator canisters, splash suits, etc.;
- Disposable equipment – This may include plastic ground and equipment covers, aluminum foil, conduit pipe, composite liquid waste samplers, tubing, broken or unused sample containers, sample container boxes, tape, etc.;
- Soil and sediment cuttings from hand auguring;
- Cleaning fluids such as spent solvents and wash water; and
- Packing and shipping materials.

The Cheraw Site soils and sediments contain chemical compounds or wastes that satisfy the definition of a Resource Conservation and Recovery Act hazardous waste. Consequently, all IDW will be treated as hazardous.

Non-hazardous PPE, disposable equipment, paper, cardboard, or other solid waste may be disposed in a private or public dumpster or waste dumpster at the Highland manufacturing plant or household waste materials. Permission will be obtained from Highland before IDW will be disposed in the plant waste dumpster.

Environmental media IDW such as soil and sediment collected in excess of the volume needed for sampling purposes will be containerized in steel 55-gallon drums and staged in a secure location for future characterization and disposal during the removal action.

Equipment decontamination wash water will be collected in poly containers until they can be characterized for disposal following completion of the removal action. Full poly containers will be staged in a secure location.

11.0 REFERENCES

The following references were used during preparation of this FSAP:

Administrative Settlement Agreement and Order on Consent for Removal Action October 2017; Docket No. 04-2017-3459; issued on October 23, 2017 by United Stated Environmental Protection Agency Region IV, Atlanta, Ga.

EPA, November 2001; *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*; prepared by US EPA Region IV, 980 College Station Road, Athens, Georgia, 30605-2720.

EPA, SESD Operating Procedure for Field Equipment Cleaning and Decontamination, SESDPROC-205-R3, December 18, 2015.

EPA, SESD Operating Procedure for Logbooks, SESDPROC-205-R3, May 30, 2013.

EPA, SESD Operating Procedure for Sediment Sampling, SESDPROC-200-R3, August 21, 2014.

EPA, SESD Operating Procedure for Soil Sampling, SESDPROC-300-R3, August 21, 2014.

EPA, SESD Operating Procedure for Field Sampling Quality Control, SESDPROC-011-R5, April 26, 2017.

EPA, SESD Operating Procedure for Management of Investigation Derived Waste, SESDPROC-202-R3, July 3, 2014.

EPA, SESD Operating Procedure for Packing, Marking, Labeling and Shipping for Environmental and Waste Samples, SESDPROC-209-R3, February 4, 2015.

EPA, SESD Operating Procedure for Waste Sampling, SESDPROC-302-R3, December 16, 2016.

AECOM, November 2017; *Quality Assurance Project Plan*; prepared by AECOM, 1360 Peachtree Street, Suite 500, Atlanta, GA 30309.

FIGURES

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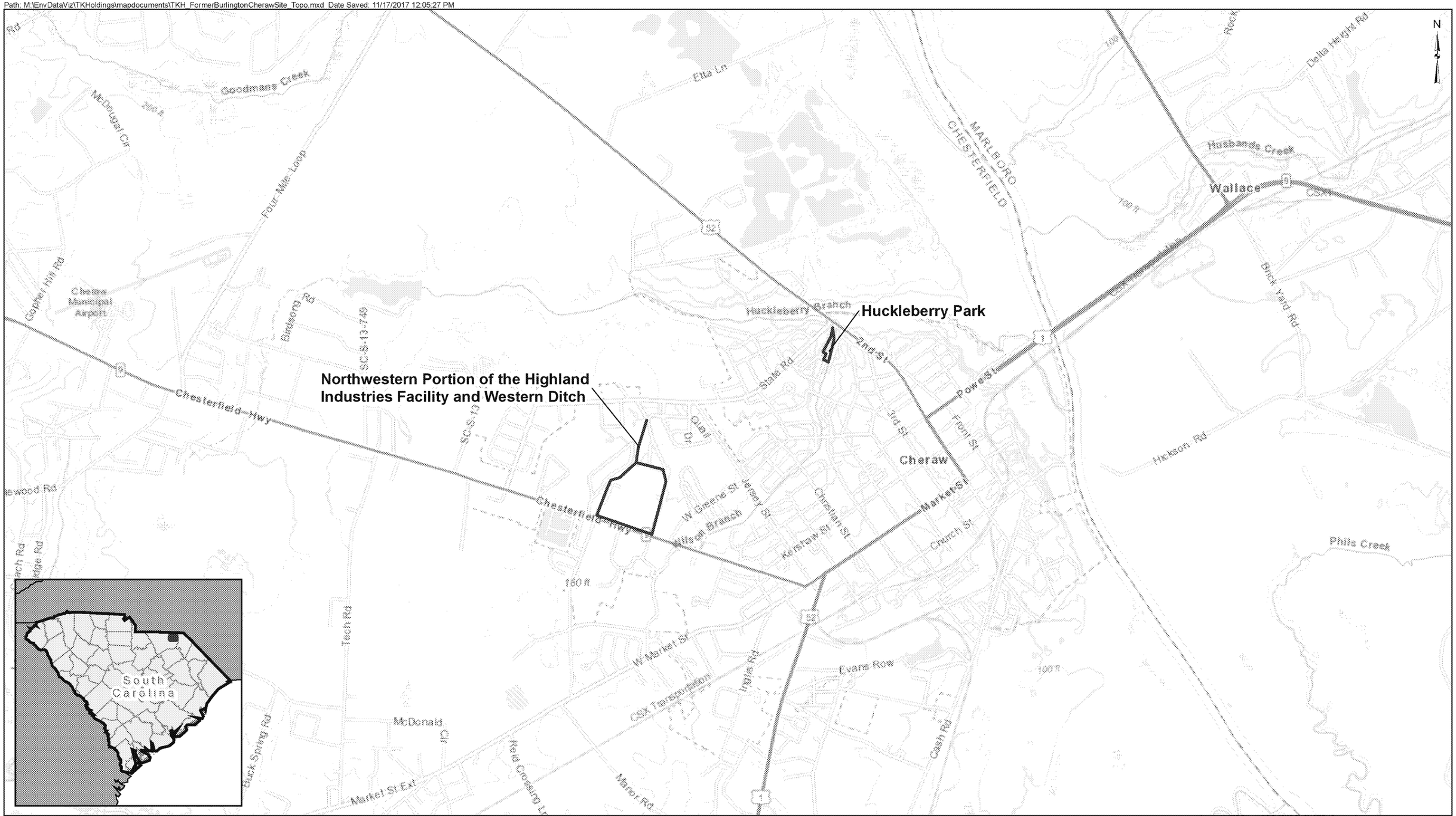

Legend

Site Features

Data Source: USGS - Cheraw Quadrangle

SCALE (FEET)
0 2,000

FIGURE 1

SITE LOCATION MAP

DRAWN BY:	REVIEWED BY:	APPROVED BY:	DATE:	PROJECT NO:
Lance.Greene	JPV	JPV	11/17/2017	60559020

TK HOLDINGS, INC.
FORMER BURLINGTON INDUSTRIES SITE
650 CHESTERFIELD HWY, CHERAW, SC 29520

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Legend

- Former Burlington Industries Facility
- Western Ditch
- Huckleberry Park
- Streams

SCALE (FEET)
0 800

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FIGURE 2

SITE AND VICINITY MAP

DRAWN BY:	REVIEWED BY:	APPROVED BY:	DATE:	PROJECT NO.:
Lance.Greene	JPV	JPV	11/17/2017	60559020

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